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Burmapsilocephala cockerelli, a new genus and species of Asiloidea (Diptera) from Burmese amber

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SYNOPSIS. *Psilocephala electrella* Cockerell is figured, and another asiloid fly, *Burmapsilocephala cockerelli* gen. et sp. nov., is described from Burmese amber. The new genus is hypothesized to be close to the extant genus *Apsilocephala*. The phylogenetic position of *Apsilocephala* is discussed.

INTRODUCTION

Psilocephala electrella was described by Cockerell (1920) from Burmese amber based on an inclusion with incomplete wings and body. Through the courtesy of Mr A.J. Ross (Natural History Museum, London) and Prof. A.P. Rasnitsyn (Paleontological Institute, Moscow) the collection of flies in Burmese amber stored in the Natural History Museum, including the holotype of this species (In.20148) (Fig. 1), was available for study. It is difficult to be certain that this species belongs to the genus *Psilocephala*, because characteristic features are not preserved. Another specimen (In.20167) (Fig. 4) belonging to the superfamily Asiloidea was discovered, with wing venation and leg structures resembling those of the holotype of *Psilocephala electrella*. However, it differs from the latter in having a slender body and more robust thoracic bristles, except for the dorsocentrals. On balance, it proved to be a representative of a new genus described here.

SYSTEMATIC DESCRIPTIONS

The following abbreviations are used:

For thoracic macrosetae: *ppn* = postpronotal, *npl* = notopleural, *sa* = supraalar, *pa* = postalar.

For the positions of setal rows in tibiae: *v* = ventral, *pv* = posteroventral, *av* = anteroventral, *d* = dorsal, *pd* = posterodorsal, *ad* = anterodorsal.

Order **DIPTERA**
Superfamily **ASILOIDEA**
Family **APSILOCEPHALIDAE**
Genus ***BURMAPSILOCEPHALA*** nov.

NAME. The name is derived from Burma, and the genus name *Apsilocephala*.

TYPE SPECIES. *Burmapsilocephala cockerelli* nov.

DIAGNOSIS. Scape, pedicel, and first flagellomere subequal in length. Antennal stylus 2.5 times longer than antennal segments 1–3 combined, and slightly thinner than in *Apsilocephala*. Proboscis slightly longer and does not appear to be as fleshy as in *Apsilocephala*. Postpronotal lobe has a single, strong seta. Mesonotum covered with hairs. One pair of strong scutellar setae present. The foretibial macrosetae have the formula 5*v*, 5*pv*, 5*av*, 5*pd*, 5*ad*. The hindtibia has fewer than 10*pd* macrosetae.

REMARKS. *Burmapsilocephala* is taxonomically close to the extant genus *Apsilocephala* Kröber, 1914, with only minor morphological differences. In *Apsilocephala* the pedicel is about half the length of the scape or first flagellomere, which are subequal. The antennal stylus is 1.0 to 1.5 times longer than antennal segments 1–3. The postpronotal lobe has long hairs but no macrosetae. Two pairs of scutellar setae are usually present, although one pair can be stronger than the other. The foretibia of *Apsilocephala* has only 2–3*pd* and 0–1*ad*, and hindtibia has more than 10*pd*. *Burmapsilocephala* differs from *Apsilocephala* and therevids, in possessing a long stylus and vein R5 ends near the wing tip. Remarkable is the absence of robust dorsocentrals in *Burmapsilocephala*.

Burmapsilocephala cockerelli sp. nov. Figs 2–4

NAME. The name is in the memory of T.D.A. Cockerell.

MATERIAL AND LOCALITY. Holotype In.20167, from Burmese amber, Hukawng Valley, Myanmar (Burma); probably Upper Cretaceous (see Zherikhin and Ross, this volume).

DESCRIPTION. Female, the tip of abdomen not discernible. Body and legs slender.

Head: Frons narrow, bare. Ocellar triangle nearly flattened. Scape (1), pedicel (2), and first flagellomere (3) subequal in length. Scape and pedicel with short hairs apically. First flagellomere slightly tapered to apex. Stylus apical, 2.5 times longer than segments 1–3 combined.

Thorax (Fig. 2): Postpronotal lobe relatively large. Mesonotum highly arched, covered with short hairs. Postalar tubercles distinct. Macrosetal pattern: 1*ppn*, 2*npl*, 1*sa*, 1*pa*. Scutellum small, trapeziform; with 1 pair strong macrosetae; covered with long hairs. Pteropleuron bare. Metathorax relatively large. Halter pale with darker knob. Fascicle of long delicate hairs anterior to halter.

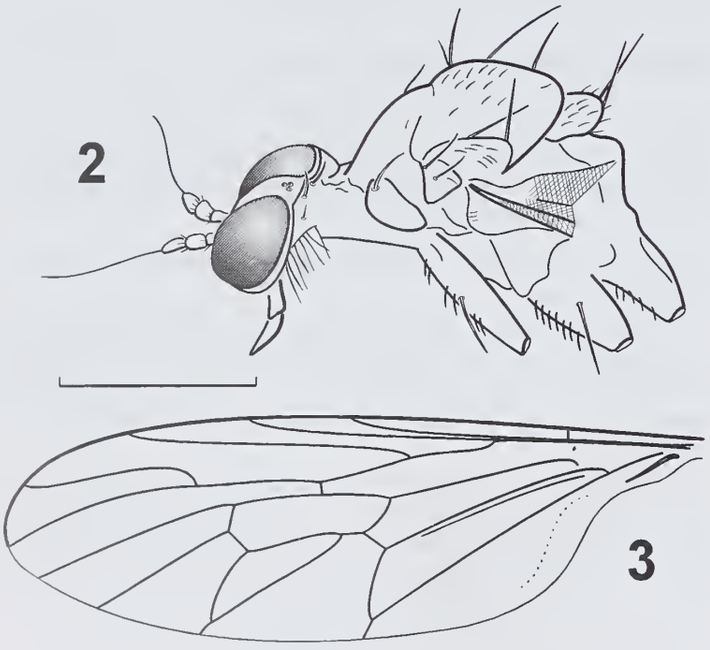
Wing (Fig. 3) with cell *m3* closed and stalked; costal vein terminates at wing tip.

Legs: Coxae with long hairs. Hind femur without macrosetae. Foretibia with apical ringlet of five macrosetae, and rows of

Fig. 1 *Psilocephala electrella* Cockerell, holotype In.20148, Burmese amber. Width of wing 1.5mm

macrosetae with formula 5*v*, 5*ad*, 5*pd*, 5*pv*, 5*av*. Midtibia with apical ringlet of 4–5 macrosetae, and rows of macrosetae with formula 3*d*, 4*ad*, 2*p*, 3*pv*, 2*pd*. Hindtibia with asymmetrical, apical ringlet of macrosetae, and rows of strong and weak macrosetae with formula 3*ad*, 7 (?8)*pd*, 1*pv* (in distal third), 6*av*. Metatarsus with rows of strong hairs ventrally (at least in basal half), and with lateral setae, and with 4 (?5) strong apical setae. Tarsal segments 2–5 haired and with apical setae. Empodium bristle-like. Pulvilli and tarsal claws small.

Abdomen (Fig. 4): Tergite 1 three times shorter than tergite 2; with lateral fascicles of long hairs. Tergites 3–6 subequal in length.



Figs 2, 3 *Burmapsilocephala cockerelli* gen. et sp. nov., holotype In.20167, Burmese amber. **2,** head and thorax; **3,** wing venation; scale bar 1mm.

Fig. 4 *Burmapsilocephala cockerelli* gen. et sp. nov., holotype In.20167, Burmese amber. Length 5.3mm.

Tergite 2 longer than others; tergite 7 slightly shorter than others. Tergites dark with pale, narrow band along lateral and posterior margins. Tergites 1–5 covered sparsely with short hairs; 6–8 covered with short hairs. Tergite 9 smaller and slender than the others, with long and short seta-like hairs.

MEASUREMENTS. Body length (without antennae) = 5.3mm, wing length = 2.7mm, wing width = 1.2mm.

DISCUSSION. *Apsilocephala* was originally described as a member of the Therevidae (Kröber, 1914), but this certainly represents an enigmatic genus. *Apsilocephala* was considered separate from Therevidae by Irwin (1976) and Irwin and Lyneborg (1981), but the position of the genus was not considered further. *Apsilocephala* was given family status, and included the genera *Clesthentia* White, 1914 and *Clesthentiella* Nagatomi, Saigusa, Nagatomi et Lyneborg, 1991 (Nagatomi *et al*, 1991*a*). However, the monophyly of the group, or at least its ranking at family-level, was questioned due to absence of definitive synapomorphies (Sinclair *et al*, 1994). The phylogenetic comments herein do not address the monophyly or internal classification of the family Apsilocephalidae, but only its position within the Diptera.

Nagatomi *et al* (1991*a*, *c*) hypothesized a close affinity of Apsilocephalidae with the Middle to Late Jurassic family Rhagionempididae based on superficial similarities, but noted that the most important characteristics (e.g. male and female genitalia, condition of empodium) are not known in the rhagionempidids. Nevertheless, Nagatomi and Yang (1998) did synonymize Apsilocephalidae under fossil Rhagionempididae. It seems to be precocious now. Further, Nagatomi *et al* (1991*a, b, c*) and Nagatomi (1992, 1996) hypothesized a sister-group relationship with Empidoidea or with Eremoneura, based again on the presence of surstyli in the male genitalia. Griffiths (1994, 1996), Sinclair *et al* (1994), Cumming *et al* (1995), and Zatwarnicki (1996) rejected this hypothesis based on the observation that the 'surstyli' of Apsilocephalidae were erroneously considered homologous to the structures of Empidoidea and Eremoneura. Sinclair *et al* (1994) and Cumming *et al* (1995) retained the genus *Apsilocephala* within the concept of Therevidae, but as *incertae sedis* (without further comment on *Clesthentia* or *Clesthentiella*). Additional consideration by

Yeates (1994) also maintained this position of *Apsilocephala* very near to Therevidae, and current morphological (M.E. Irwin, pers. comm.) and molecular (L.L. Yang and B.M. Wiegmann, pers. comm.) studies also suggest that *Apsilocephala* is very near or possibly within Therevidae. Therefore, the concept of *Apsilocephala* or the Apsilocephalidae as being near the stem of Eremoneura could be rejected in favour of its original position within or near the Therevidae. However, we keep the families Apsilocephalidae and Therevidae apart and avoid the formal synonymy until the position of fossil Rhagionempididae is clarified.

The monophyly of this family as defined by Nagatomi *et al* (1991*a*) needs further consideration and definition with synapomorphies, but *Burmapsilocephala* is certainly closely aligned with *Apsilocephala*. Following are characteristics of *Burmapsilocephala* shared with *Apsilocephala* that support this hypothesized affinity and preclude the fossil genus from being placed elsewhere in the Asiloidea or Empidoidea. The elongated, apical, antennal stylus is similar to that in *Apsilocephala* and unique among therevids, as is the shape of the first flagellomere. The empodium is setiform, not pulvilliform. The scutum has macrosetae (including *ppn*, *npl*, and *sa*), as does the scutellum. The pteropleuron is bare. The wing venation is identical to that in *Apsilocephala*, with the costal vein and R5 terminating at the wing tip. The halter is pale, with a darker knob. Each tibia has an apical ringlet of macrosetae. The lengths of abdominal tergites relative to each other are consistent with that found in *Apsilocephala*.

The extant species *Apsilocephala longistyla* Kröber, 1914, has a distribution restricted to the southwestern U.S.A. (Arizona, California, New Mexico, and Utah), and Mexico. Additionally, an undescribed fossil species of *Apsilocephala* is known from Eocene/Oligocene Baltic amber (S.D. Gaimari pers. observ.). The other members of Apsilocephalidae are currently known from Tasmania and New Zealand. Information on the biology and immature stages of *Apsilocephala* is largely unknown, although adults of *Apsilocephala longistyla* have been collected in emergence traps placed over rock crevices filled with loose, friable soil (W.J. Hanson pers. comm.).

Nagatomi *et al*'s (1991*a*,*c*) proposed affinity of Apsilocephalidae with Rhagionempididae suggests a Jurassic origin, yet the earliest known fossils belonging to Apsilocephalidae (herein) are probably Upper Cretaceous in age. This certainly does not exclude Apsilocephalidae from being present in the Jurassic. Therevidae were certainly extant during the Jurassic, with evidence from earliest known fossil therevid, *Rhagiophryne bianalis* Rohdendorf, 1964, found in number in the Middle–Upper Jurassic deposits in southern Kazakhastan (Mostovski 1998). Asilids and presumable scenopinids and hilarimorphids are also recorded there.

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